

## REMARKS

Applicants respectfully request further examination and reconsideration in view of the above amendments and the comments set forth fully below. Claims 1-70 were pending. Within the previous Office Action, Claims 1-70 have been rejected. By the above amendments, Claims 1-7, 15, 16, 18-21, 29, 31-35, 38, 40-44, 57 and 70 have been amended, Claims 17 and 30 have been canceled and new Claims 71-75 have been added. Accordingly, Claims 1-16, 18-29 and 31-75 are now pending.

The Applicants' attorney would like to thank Examiner Hageman and Examiner Mackey for their time and courteousness during the personal interview on September 18, 2007. During this interview the above amendments to the claims were discussed in light of the teachings of the cited references.

### **Rejections Under 35 U.S.C. § 103**

Within the previous Office Action, Claims 1-69 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,314,071 to Christian et al. (hereinafter referred to as "Christian"). Christian teaches a glass sorter including an opaque sorter 16, a green sorter 17 and a brown sorter 18. [Christian, col. 1, lines 46-49, Figures 1 and 2] Christian teaches that the opaque sorter 16 comprises a first conveyor 21, the green sorter 17 comprises a second conveyor 27 and the brown sorter 18 comprises a third conveyor 33. [Christian, col. 1, line 50 - col. 2, line 4, Figure 2] The first conveyor 21 directs glass between the first lamp array 22 and the first sensor array 23 and the first ejector array 24 ejects opaque materials from the path of flow. [Christian, col. 3, lines 2-10, Figure 2] Material not ejected by the first ejector array 24 falls on the second conveyor 27. [Christian, col. 3, lines 10-14, Figure 2] The second conveyor 27 directs glass between the second lamp array 28 and the second sensor array 29 and the second ejector array 30 deflects green glass from the path of flow. [Christian, col. 3, lines 10-17, Figure 2] Material not ejected by the second ejector array 30 falls on the third conveyor 33. [Christian, col. 3, lines 14-21, Figure 2] The third conveyor 33 directs glass between the third lamp array 34 and the third sensor array 35 and the third ejector array deflects brown glass out of the flow while the remaining clear glass falls into a clear glass area. [Christian, col. 3, lines 21-25, Figure 2]

In an *alternate* embodiment, Christian also teaches another configuration of sorters where part of the output of a first sorter becomes the input of two subsequent sorters. [Christian, col. 7, lines 37-47, Figure 11] Christian specifically teaches

FIG. 11 illustrates *another configuration* of the sorters. A first sorter 220 is set to separate material A from material B. Output B is fed into a second sorter 112, which also separates material A from material B. Output A from the second sorter 112 is fed back into the first sorter 110, while output B from the second sorter 112 is now twice purified output B. Output A from the first sorter 110 is fed to a third sorter 114. Output B from the third sorter is fed back to the first sorter 110, while output A from the third sorter is twice purified output A. [Christian, col. 7, lines 37-47, Figure 11, emphasis added]

In this embodiment, illustrated in Figure 11 of Christian, there is a linear progression of the sorting system, such that the output streams from the first sorter 110 are both provided to the second sorters 112 and 114. [Christian, Figure 11] Christian does not teach or make obvious that any of the streams from the first sorter bypass the second sorters and are provided to a third sorter.

In a further *alternate* embodiment, Christian teaches a sorter with actuators that sort cullet into three bins. [Christian, col. 7, line 55 - col. 8, line 8, Figure 12] Regarding this alternate embodiment, Christian specifically teaches

FIG. 12 illustrates *another embodiment* of the invention. In this embodiment a loader 202 feeds crushed glass to a conveyor 204. The conveyor 204 trajectories the crushed glass along a path first between a lamp array 206 and a sensor array 208 and then between a first array of actuators 210 and a second array of actuators 212. Along the trajectory is a first bin 214, a second bin 216, and a third bin 218. Light is transmitted from the lamp array 206 to the sensor array 208. Signals from the sensor array are processed and sent to a controller. The controller causes either an actuator from the first actuator array 210 to actuate or an actuator from the second actuator array 212 to actuate or no actuators to actuate. If an actuator from the first actuator array 210 actuates, crushed glass is blown by the air jet of actuator into the third bin 218. If an actuator from the second actuator array 212 actuates, crushed glass is blown by the air jet of the actuator into the first bin 214. In no actuators are actuated, crushed glass falls into the second bin 216. Conveyors may be placed at the bottom of the bins 214, 216, 218 to convey the crushed glass to desired locations. [Christian, col. 7, line 55 - col. 8, line 8, Figure 12, emphasis added]

Christian teaches that the embodiments of Figures 2, 11 and 12 are *alternates* of each other for achieving the result of sorting the cullet. There would be no motivation to combine the *alternate* embodiments taught within Christian. Further, there is no hint, teaching or suggestion within Christian that these *alternate* embodiments should or could be combined. Christian teaches that these embodiments are *alternates* of each other. There is never a suggestion in

Christian to combine these embodiments. Also, Christian does not teach a plurality of output feeds from first stage sorting devices, some of which are provided to a second stage sorter and some of which bypass the second stage sorter and are provided directly to a third stage sorter.

Within the previous Office Action, it is stated that it would have been obvious to one of ordinary skill in the art to combine the different embodiments to achieve a purer sort or more groupings. The applicants respectfully disagree with this conclusion.

Within the previous Office Action, it is further stated that motivation to combine the parallel sorting embodiment is providing a more thorough and accurate sort and motivation for combining the triple output sorter being the capability to sort into more than two fractions in one step. Again, the applicants respectfully disagree with this conclusion. The only motivation that has been put forth within the previous Office Action is all based on hindsight. No examples of motivation within Christian have been provided. As discussed below in detail, motivation based on hindsight is not proper and cannot be used to reject claims under section 103.

For a proper obviousness rejection, there must be some hint, teaching or suggestion within Christian itself. The reason that no examples of motivation within Christian have been provided is that there are none. As discussed above, Christian teaches that the two embodiments are *alternates* of each other and were never meant to be combined.

This is a classic case of impermissibly using hindsight to make a rejection based on obviousness. The Court of Appeals for the Federal Circuit has stated that “it is impermissible to use the claimed invention as an instruction manual or ‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.” In Re Fritch, 972 F.2d, 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). As discussed above, Christian teaches that the embodiments of Figures 2, 11 and 12 are *alternates* of each other. No where in Christian is there any hint, teaching or suggestion to combine any of the *alternative* embodiments.

It is well settled that to establish a *prima facie* case of obviousness, three basic criteria must be met:

- 1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;
- 2) there must be a reasonable expectation of success; and
- 3) the prior art reference, or references, must teach or suggest all the claim limitations. MPEP § 2143.

The burden of establishing a *prima facie* case of obviousness based on the teachings of the alternative embodiments of Christian has not been met within the previous Office Action. Christian teaches that the embodiments of Figures 2, 11 and 12 are *alternates* of each other. There is not the required suggestion or motivation within the teachings of Christian to combine the *alternative* embodiments.

Even if considered proper, the combination of the *alternate* embodiments of Christian does not teach multi-stage sorting as claimed in present application. In contrast to the teachings of Christian, the method and apparatus for multi-stage sorting of glass cullets of the present invention includes a plurality of sorting devices which simultaneously sort different colored objects based on their light transmission properties into more than two output feeds, wherein at least one output feed is a subsequent input feed to one or more sorting devices in the plurality. The one or more sorting devices sort the at least one subsequent input feed into a plurality of further sorted output feeds. Output feeds from first stage sorting devices are provided to a second stage sorter. Some of the output feeds from the first stage sorting devices bypass the second stage sorter and are provided directly to a third stage sorter. The third stage sorter receives some of the output feeds from the first stage sorting devices and an output feed from the second stage sorting device. The third stage sorting device sorts one or more subsequent input feeds into a plurality of final output feeds. Figure 3 of the Present Specification and the accompanying text on page 11, lines 15-24 describe the sorting devices operating simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As further described above, Christian does not teach a plurality of output feeds from first stage sorting devices, some of which are provided to a second stage sorter and some of which bypass the second stage sorter and are provided directly to a third stage sorter.

Claim 1 is directed to a system for sorting a mixed stream of different colored objects into separate groups of same colored objects. The system of Claim 1 comprises a plurality of first stage sorting devices each for receiving an input feed of different colored objects and sorting the different colored objects into a plurality of first stage output feeds, wherein the plurality of first stage sorting devices operate simultaneously, and further wherein at least one of the plurality of sorting devices sorts the different colored objects into more than two output feeds, a second stage sorting device configured to receive at least one of the first stage output feeds, thereby forming a

second stage output feed and a third stage sorting device configured to directly receive at least one of the first stage output feeds which bypass the second stage sorting device and the second stage output feed, thereby forming a third stage output feed. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also discussed above, even if considered proper, the combination of the *alternate* embodiments of Christian does not teach a third stage sorting device configured to directly receive at least one first stage output feeds which bypass the second stage sorting device and the second stage output feed, thereby forming a third stage output feed. For at least these reasons, the independent Claim 1 is allowable over the teachings of Christian.

Claims 2-14 are dependent on the independent Claim 1. As discussed above, the independent Claim 1 is allowable over the combination of the *alternate* embodiments of Christian. Accordingly, Claims 2-14 are all also allowable as being dependent on an allowable base claim.

The independent Claim 15 is directed to a method of effectively sorting a group of different colored objects into separate groups of similar colored objects. The method of Claim 15 comprises receiving an input feed having a plurality of objects, sorting the input feed at a plurality of first stage sorting devices into a plurality of first stage output feeds, wherein sorting occurs simultaneously for the input feeds, sorting at least one of the first stage output feeds at a second stage sorting device thereby forming a second stage output feed and sorting at least one of the first stage output feeds received directly from a corresponding one of the first stage sorting devices, and the second stage output feed, at a third stage sorting device, thereby forming a third stage output feed. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, even if considered proper, the combination of the *alternate* embodiments of Christian does not disclose, teach, or even suggest sorting at least one of the first stage output feeds received directly from a corresponding one of the first stage sorting devices, and the second stage output feed at a third stage sorting device, thereby forming a third stage output feed. For at least these reasons, the independent Claim 15 is allowable over the teachings of Christian.

Claim 17 has been canceled by the above amendment. Claims 16 and 18-28 are dependent on the independent Claim 15. As discussed above, the independent Claim 15 is allowable over the combination of the *alternate* embodiments of Christian. Accordingly, Claims 16 and 18-28 are all also allowable as being dependent on an allowable base claim.

The independent Claim 29 is directed to a method of effectively sorting different colored objects into a plurality of groups of objects having a similar desired quality. The method of Claim 29 comprises providing a plurality of first stage sorting devices, wherein each first stage sorting device receives a mixture of objects of different qualities and separates the different received objects into two or more first stage output feeds, each first stage output feed having objects of a substantially similar quality, wherein the plurality of first stage sorting devices operate simultaneously, further wherein at least one of the plurality of first stage sorting devices sorts the different colored objects into more than two first stage output feeds, sorting at least one of the first stage output feeds at a second stage sorting device thereby forming a second stage output feed and sorting at least one of the first stage output feeds received directly from a corresponding one of the first stage sorting devices, and the second stage output feed, at a third stage sorting device, thereby forming a third stage output feed. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, even if considered proper, the combination of the *alternate* embodiments of Christian does not disclose, teach, or even suggest sorting at least one of the first stage output feeds received directly from a corresponding one of the first stage sorting devices, and the second stage output feed at a third stage sorting device, thereby forming a third stage output feed. For at least these reasons, the independent Claim 29 is allowable over the teachings of Christian.

Claim 30 has been canceled by the above amendment. Claims 31-42 are dependent on the independent Claim 29. As discussed above, the independent Claim 29 is allowable over the combination of the *alternate* embodiments of Christian. Accordingly, Claims 31-42 are all also allowable as being dependent on an allowable base claim.

The independent Claim 43 is directed to a multi-level sorting system for separating different colored cullets into cullets having substantially similar color characteristics. The system of Claim 43 comprises a first means for sorting the cullets, wherein the first means for sorting directs the sorted cullets into more than two first output paths, a second means for further sorting at least one received first output path, wherein the second means for sorting directs the further sorted cullets into more than two second output paths, and a third means for subsequently sorting at least one received first output path received directly from the first means for sorting and at least one received second output path, wherein the third means for sorting directs the subsequently sorted cullets into more than two output paths, wherein the first means, the second means and the third means for sorting sort cullets simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of

Figures 2, 11 and 12. As also described above, even if considered proper, the combination of the *alternate* embodiments of Christian does not teach the third means for subsequently sorting at least one received first output path received directly from the first means for sorting and at least one received second output path. For at least these reasons, the independent Claim 43 is allowable over the teachings of Christian.

The independent Claim 44 recites a multi-level sorting system for separating a mixed stream of colored cullets into cullets having substantially similar color characteristics. The multi-level sorting system of claim 44 comprises a first stage tri-sorter for sorting the cullets, wherein the first stage tri-sorter directs the sorted cullets into a plurality of first stage output paths, a second stage tri-sorter coupled to the first stage tri-sorter, the second stage tri-sorter for sorting cullets in at least one received first stage output path, thereby forming a second set of sorted cullets, wherein the second stage tri-sorter directs the second set of sorted cullets into a plurality of second stage output paths, a third stage tri-sorter coupled to the first and second stage tri-sorters, the third stage tri-sorter for sorting cullets in at least one received first stage output path received directly from the first stage tri-sorter, and at least one received second stage output path, thereby forming a third set of sorted cullets, wherein the third stage tri-sorter directs the third set of sorted cullets into a plurality of third stage output paths, wherein at least one of the first, second, and third stage tri-sorters has more than two output paths, wherein the first stage tri-sorter, the second stage tri-sorter and the third stage tri-sorter sort cullets simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, even if considered proper, the combination of the *alternate* embodiments of Christian does not disclose, teach, or even suggest a third stage tri-sorter for sorting cullets in at least one received first stage output path received directly from the first stage tri-sorter and at least one received second stage output path. For at least these reasons, the independent Claim 44 is allowable over the teachings of Christian.

Claims 45-56 are dependent on the independent Claim 44. As discussed above, the independent Claim 44 is allowable over the combination of the *alternate* embodiments of Christian. Accordingly, Claims 45-56 are all also allowable as being dependent on an allowable base claim.

The independent Claim 57 is directed to a multi-level sorting system for separating a mixed stream of colored cullets into cullets having substantially similar color characteristics. The multi-level sorting system of Claim 57 comprises a plurality of first stage tri-sorters for sorting the cullets, wherein the plurality of first stage tri-sorters direct the sorted cullets into a

plurality of first output paths, a second stage tri-sorter coupled to the plurality of first stage tri-sorters, the second stage tri-sorter for sorting cullets in at least one received first output path from each first stage tri-sorter, thereby forming second sorted cullets, wherein the second stage tri-sorter directs the second sorted cullets into a plurality of second output paths, and a third stage tri-sorter coupled to the plurality of first stage tri-sorters and the second stage tri-sorter, the third stage tri-sorter for sorting cullets in at least one received first output path received directly from each of the plurality of first stage tri-sorters and at least one received second output path, thereby forming third sorted cullets, wherein the third stage tri-sorter directs the third sorted cullets into a plurality of third output paths, wherein the plurality of first stage tri-sorters, the second stage tri-sorter and the third stage tri-sorter sort simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, even if considered proper, the combination of the *alternate* embodiments of Christian does not teach a third stage tri-sorter for sorting cullets in at least one received first output path received directly from each of the plurality of first stage tri-sorters and at least one received second output path. For at least these reasons, the independent Claim 57 is allowable over the teachings of Christian.

Claims 58-69 are dependent on the independent Claim 57. As discussed above, the independent Claim 57 is allowable over the combination of the *alternate* embodiments of Christian. Accordingly, Claims 58-69 are all also allowable as being dependent on an allowable base claim.

Within the previous Office Action, Claim 70 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Christian in view of U.S. Patent No. 5,335,791 to Eason (hereinafter referred to as “Eason”) and in further view of U.S. Patent No. 4,583,695 to Genestie (hereinafter referred to as “Genestie”). The Applicants respectfully disagree. Within the previous Office Action it is recognized that Christian does not disclose a plurality of first stage tri-sorters, a third stage tri-sorter, or a light emitting source comprising one or more of a blue light emitting diode and infrared source. It is stated within the Office Action that it would be obvious to combine the tri-sorter of Christian with the parallel sorting of Christian for the purpose of sorting into more than two fractions and providing a more accurate sort. As discussed in detail above, it is not proper to combine the *alternate* embodiments of Christian. As also described above, even if considered proper, the combination of the *alternate* embodiments of Christian does not disclose, teach, or even suggest sorting at least one of the first stage output feeds received directly from a corresponding one of the first stage sorting devices, and the second stage output feed at a third stage sorting device, thereby forming a third stage output feed.



It is also stated within the Office Action that it would be obvious to combine Genestie, for the purpose of providing parallel processing and therefore improving yields and to combine Eason, for the purposes of optimizing the spectrographic analysis for specific applications and providing high accuracy at high throughput rates. The Applicants respectfully disagree. There is no hint, teaching or suggestion in either Christian, Genestie and Eason that warrants their combination. The only cited motivation within the Office Action is again based on hindsight using the presently claimed invention as a template.

The independent Claim 70 is directed to a multi-level sorting system for separating a mixed stream of colored cullets into cullets having substantially similar color characteristics. The multi-level sorting system of Claim 70 comprises a plurality of first stage tri-sorters for sorting the cullets, wherein the plurality of first stage tri-sorters direct the sorted cullets into a plurality of first output paths, a second stage tri-sorter coupled to the plurality of first stage tri-sorters, the second stage tri-sorter for sorting cullets in at least one received first output path from each first stage tri-sorter, thereby forming second sorted cullets, wherein the second stage tri-sorter directs the second sorted cullets into a plurality of second output paths and a third stage tri-sorter coupled to the plurality of first stage tri-sorters and the second stage tri-sorter, the third stage tri-sorter for sorting cullets in at least one received first output path received directly from each of the plurality of first stage tri-sorters and at least one received second output path, thereby forming third sorted cullets, wherein the third stage tri-sorter directs the third sorted cullets into a plurality of third output paths, wherein the plurality of first stage tri-sorters, the second stage tri-sorter and the third stage tri-sorter sort simultaneously, wherein at least one of the plurality of first stage tri-sorters, the second stage tri-sorter and the third stage tri-sorter comprises a light emitting source comprising one or more of a blue light emitting diode and an infrared light source. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, there is no hint, teaching or suggestion to combine Christian, Genestie and Eason. Further, even if considered proper, the combination of the *alternate* embodiments of Christian, Genestie and Eason does not teach a third stage tri-sorter for sorting cullets in at least one received first output path received directly from each of the plurality of first stage tri-sorters and at least one received second output path. For at least these reasons, the independent Claim 70 is allowable over the teachings of Christian, Eason, Genestie and their combination.

In view of the foregoing, Claims 1-16, 18-29 and 31-75, are in condition for allowance. Examination is respectfully requested and allowance is earnestly solicited at the earliest possible date. The Examiner is encouraged to call the undersigned at (408) 530-9700 to discuss with questions or concerns so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,  
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Dated: September 25, 2007

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